



# Technical Interchange Meeting

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**August 15<sup>th</sup> and 16<sup>th</sup>**



# New Mechanical Requirements (1 of 2)



- **New Mission Requirements**

- **Operational Sun Angle of 35 +/- 5 Degrees**
- **Reduce Cost > Non-Deployable Rigid Solar Array System & Reduce Part Count**

- **New Derived Requirements**

- **785,900 +/- 78,600 lbm\*in<sup>2</sup> Spin Inertia(I<sub>zz</sub>)**
- **699,400 to 715,100 lbm\*in<sup>2</sup> Transverse Inertias(I<sub>xx</sub> & I<sub>yy</sub>)**
- **15,700 lbm\*in<sup>2</sup> Difference Between Transverse Inertias(I<sub>xx</sub>-I<sub>yy</sub>)**
- **19,600 lbm\*in<sup>2</sup> Transverse Product of Inertia(I<sub>xy</sub>)**
- **450 lbm\*in<sup>2</sup> Spin Product of Inertias(I<sub>xz</sub> & I<sub>yz</sub>)**
- **.400 in Transverse C.G. Offset**
- **2.00 inches(BOL) to 4.00 inches(EOL) Axial C.G. Offset from Sun Surface of Solar Array**
- **Provide 2.7 ft<sup>2</sup>(394.0 in<sup>2</sup>) of Exposed Surface for the Trim-Tab Assembly**
- **Provide 1.9 ft<sup>2</sup>(278.0 in<sup>2</sup>) of Exposed Surface for the Trim-Area Assembly**
- **Provide 6.5 ft<sup>2</sup>(936.0 in<sup>2</sup>) of Thermal Radiation for the SC Bus Electronics in the Stowed Configuration. Must Have View to Deep Space**
- **Provide 10.8 ft<sup>2</sup>(1,555.2.0 in<sup>2</sup>) of Thermal Radiation for the SC Bus Electronics in the Deployed Configuration. Must Have View to Deep Space**



# New Mechanical Requirements (2 of 2)



- **Additional Considerations**

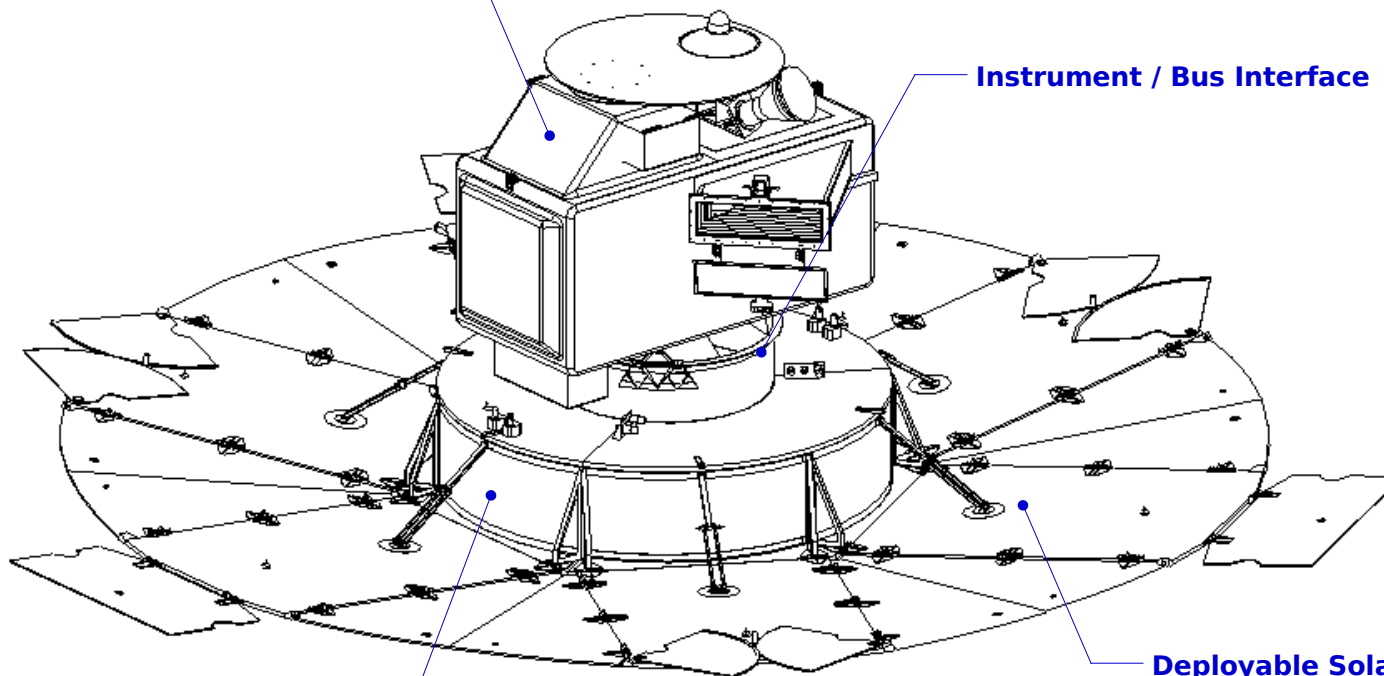
- **Able to Levy Requirements on Instrument's Configuration In Order to Utilize a Non-Deployable Rigid Solar Array Design**
- **No Need to Shade the SC Bus from the Sun During the Science Phase of the Mission In Order to Utilize a Non-Deployable Rigid Solar Array Design**
- **Continue to Use the Qualified Clementine Marmon Clamp Assembly as the Baseline**
- **Maximize the Solar Array Surface Exposed to the Sun**



# Old Baseline Design (06/20/01)



**Old Instrument Configuration**



**Instrument / Bus Interface**

**Old SC Bus Configuration**  
84.5 in Diameter

**Deployable Solar Array Assy**  
234.0 in Diameter, Deployed

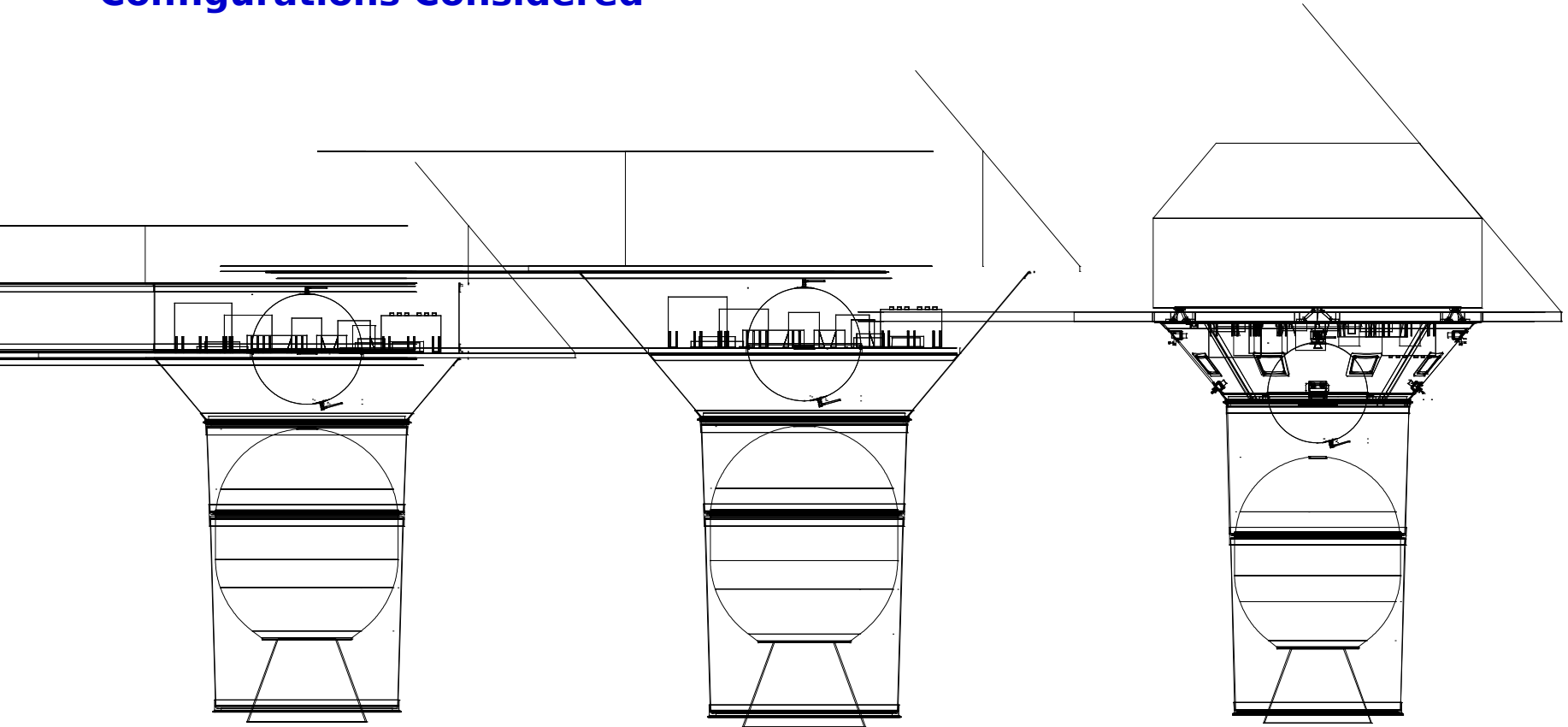
	<b>Current Estimate</b>	<b>Uncert</b>	<b>Total w Uncert</b>
<b>Instrument</b>	<b>568.9</b>	<b>117.0</b>	<b>685.9</b>
<b>SC Bus</b>	<b>1,054.3</b>	<b>142.5</b>	<b>1,196.8</b>
<b>Interstage</b>	<b>1,667.7</b>	<b>19.4</b>	<b>1,687.1</b>
<b>Flight Vehicle</b>	<b>3,290.9</b>	<b>278.9</b>	<b>3,569.8<sub>(9%)</sub></b>



# New Baseline Design Trades



- **Configurations Considered**

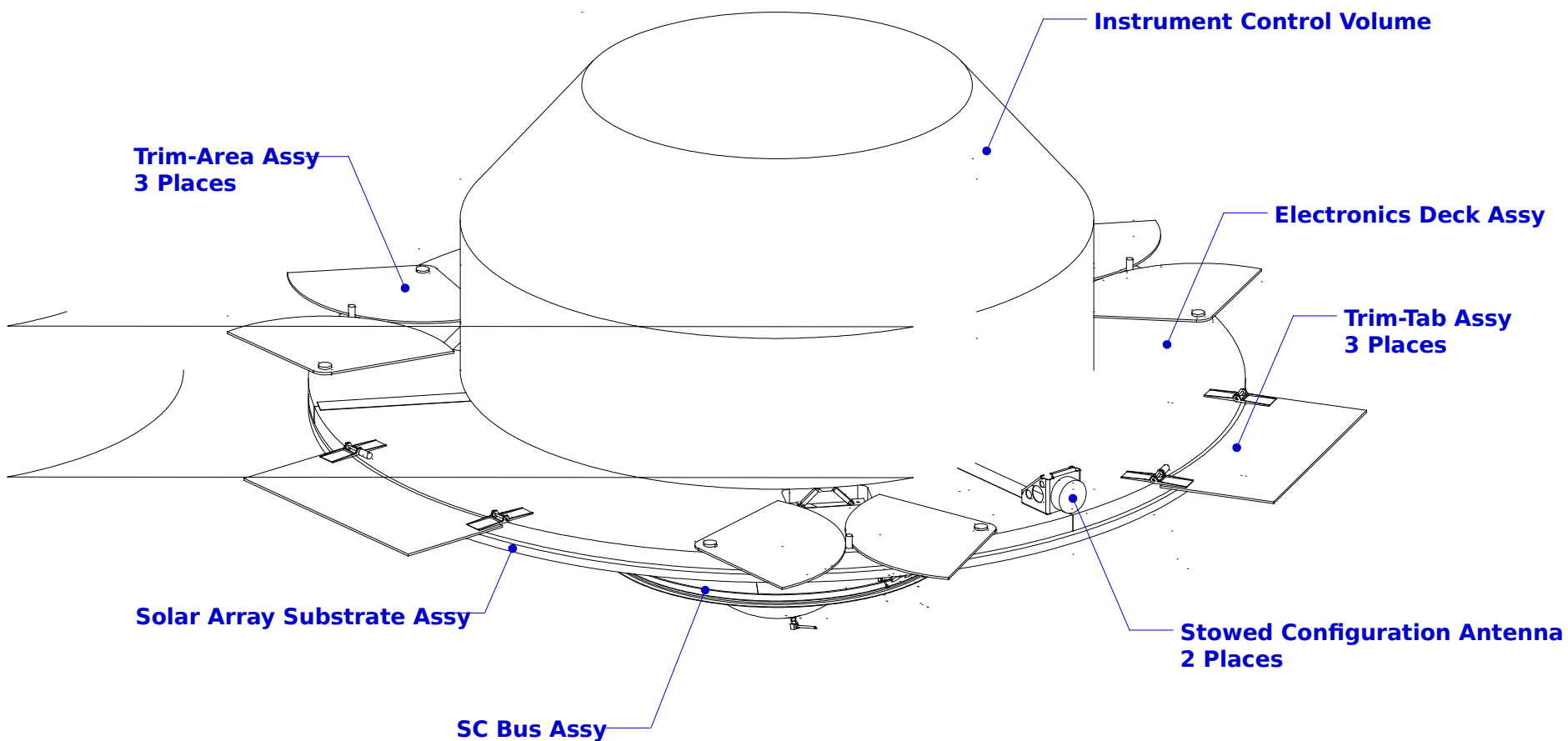




# New Baseline Design (1 of 8)



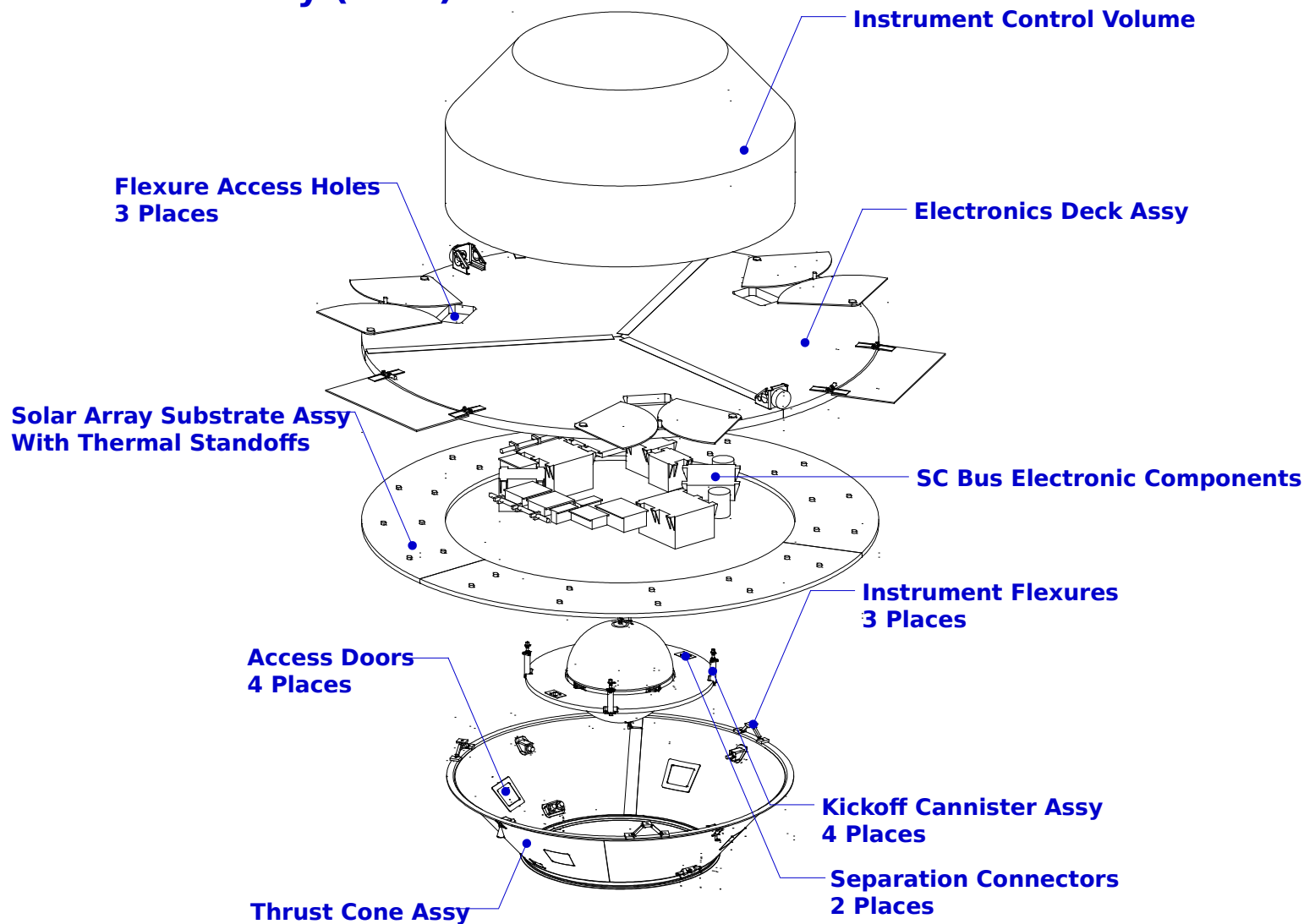
- **Spacecraft Assembly**





# New Baseline Design (2 of 8)

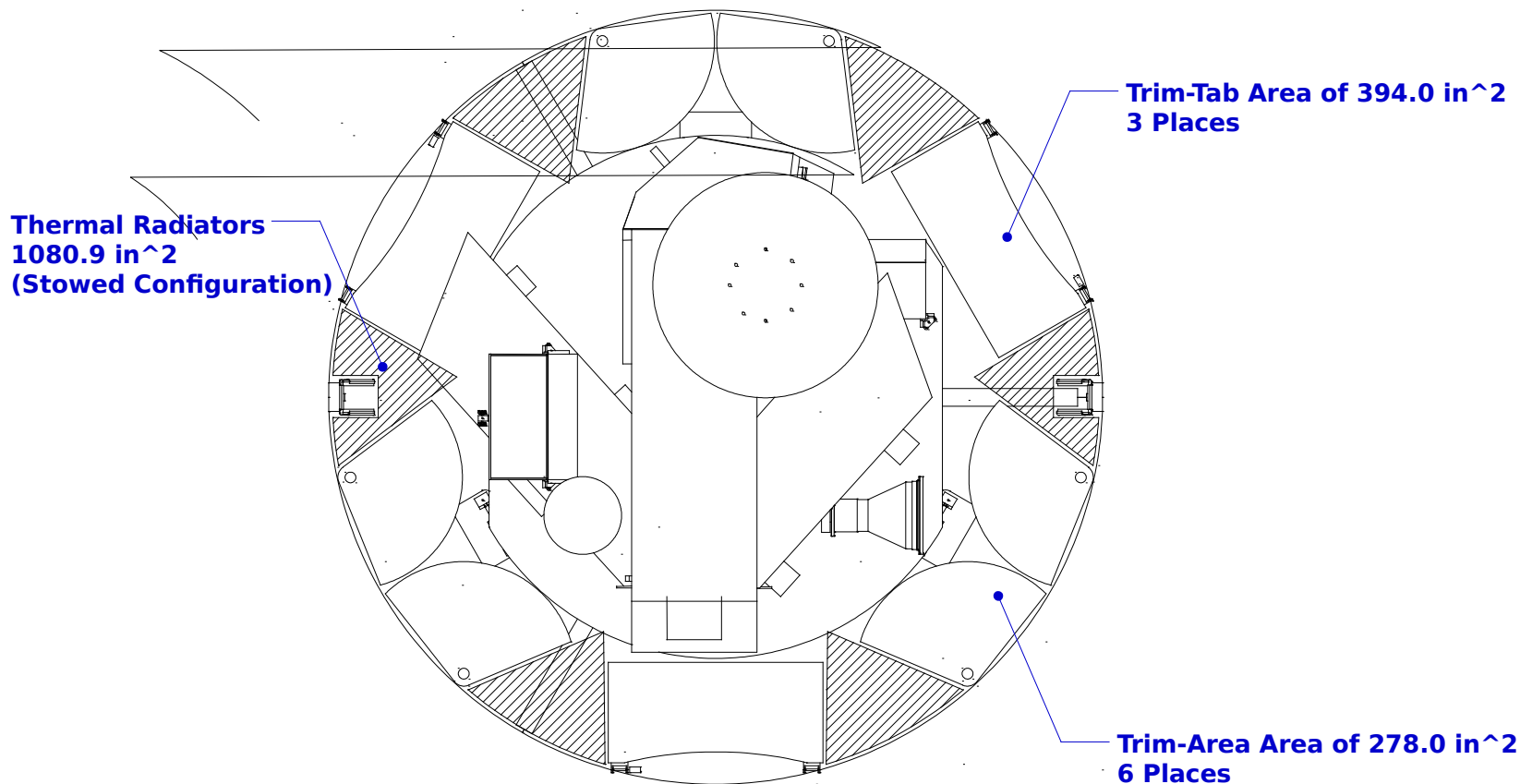
- **Spacecraft Assembly (cont)**





# New Baseline Design (3 of 8)

- **Spacecraft Assembly (cont)**

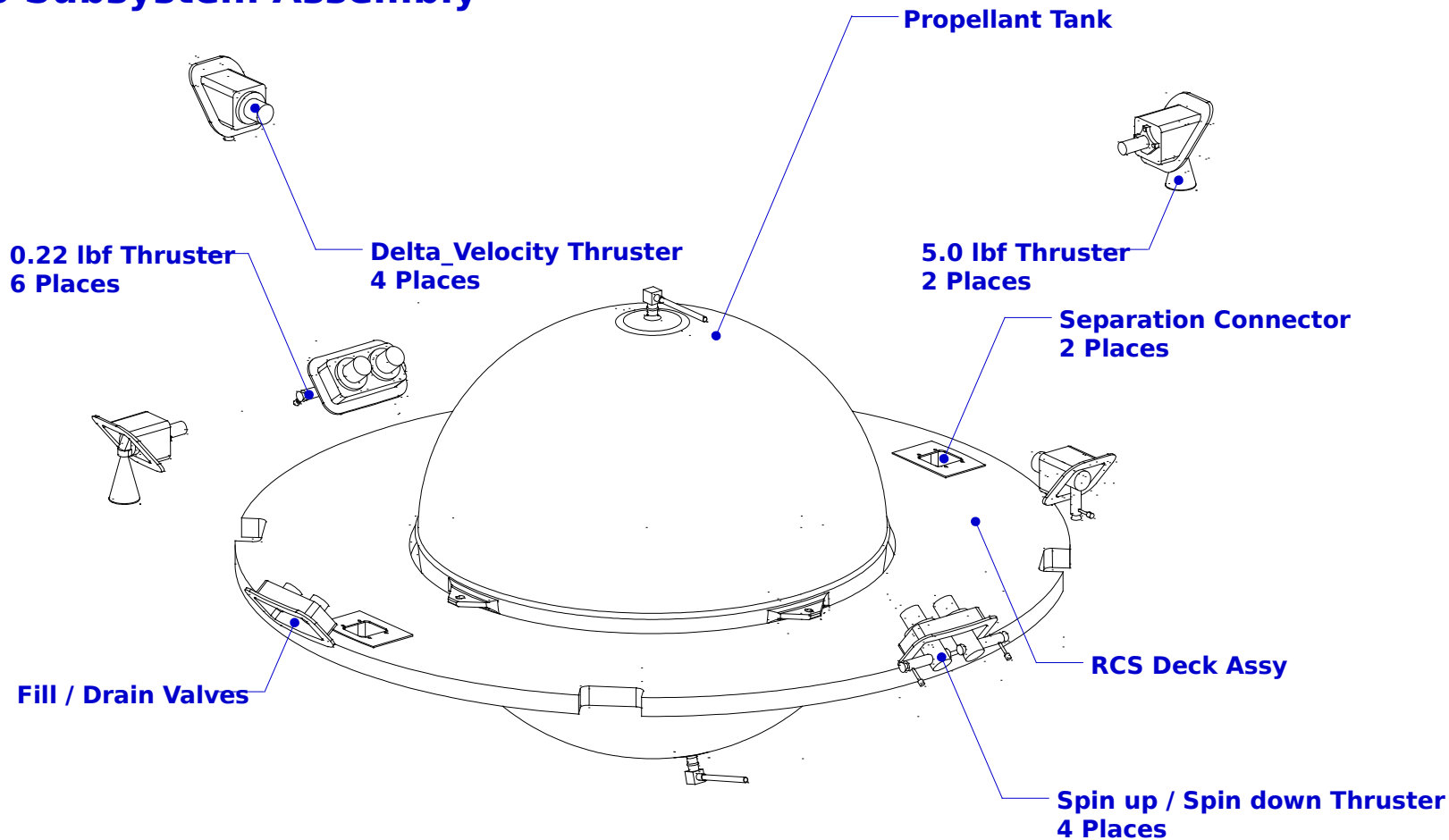






# New Baseline Design (4 of 8)

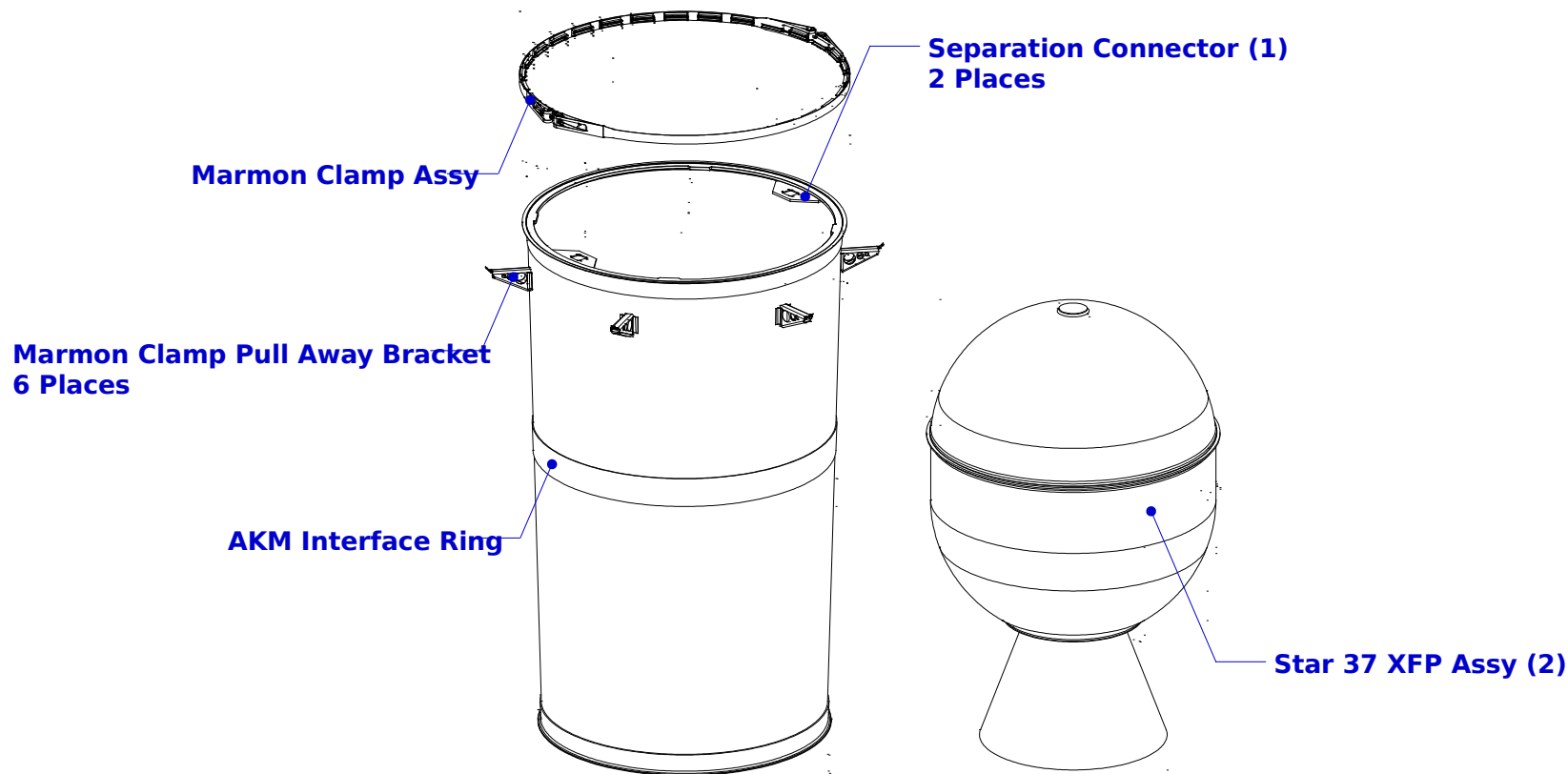
- RCS Subsystem Assembly**





# New Baseline Design (5 of 8)

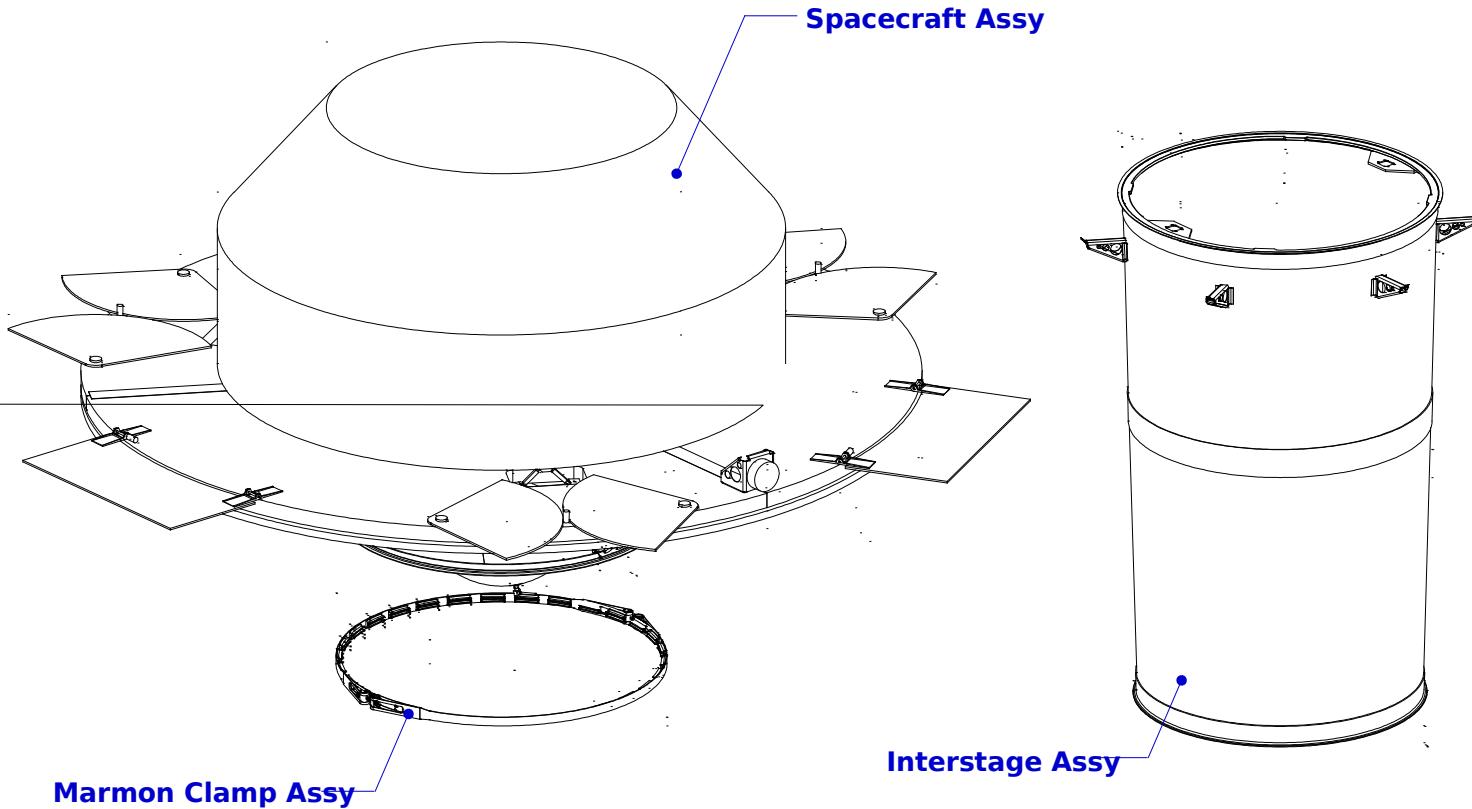
- **Interstage Assembly**





# New Baseline Design (6 of 8)

- Flight Vehicle Assembly

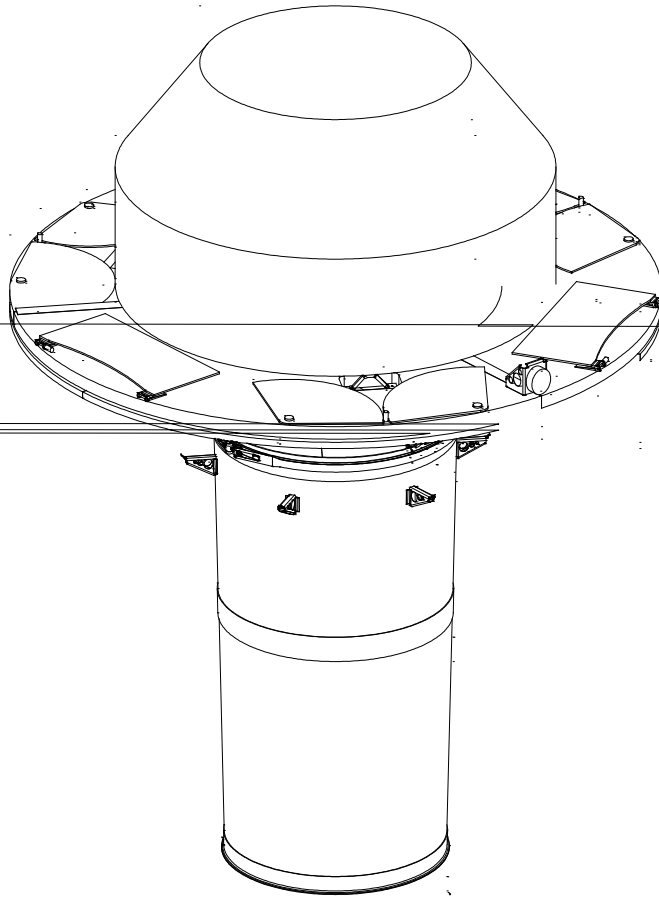




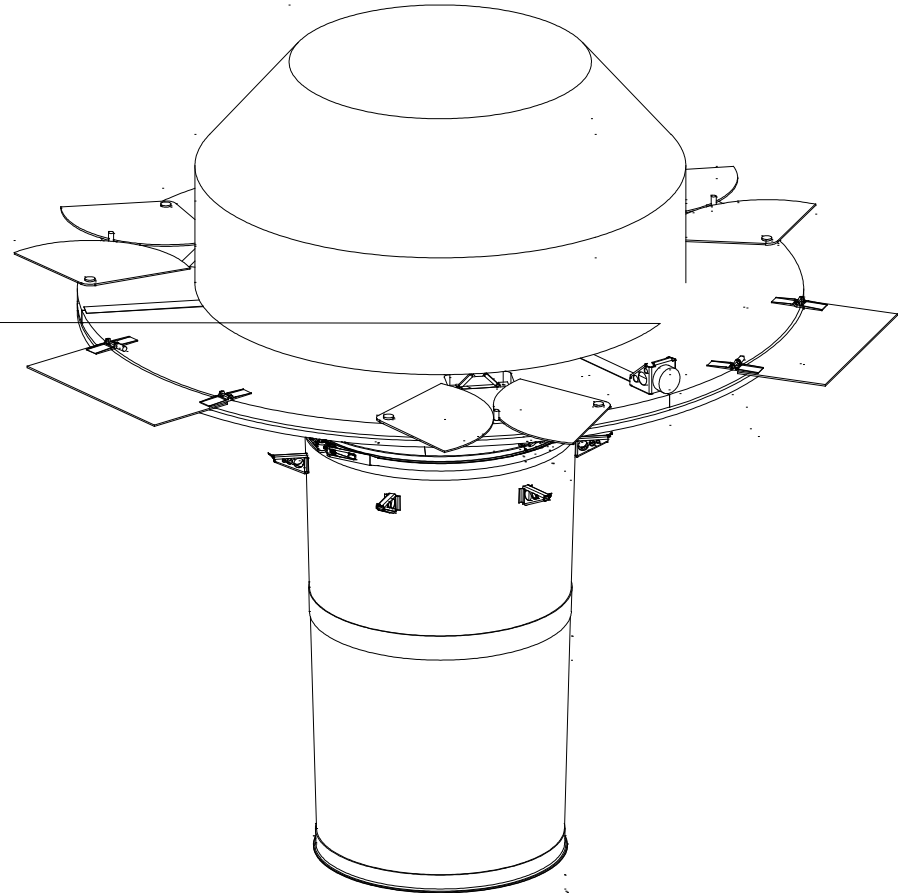
# New Baseline Design (7 of 8)



- **Flight Vehicle Assembly (cont)**



**Stowed Configuration**



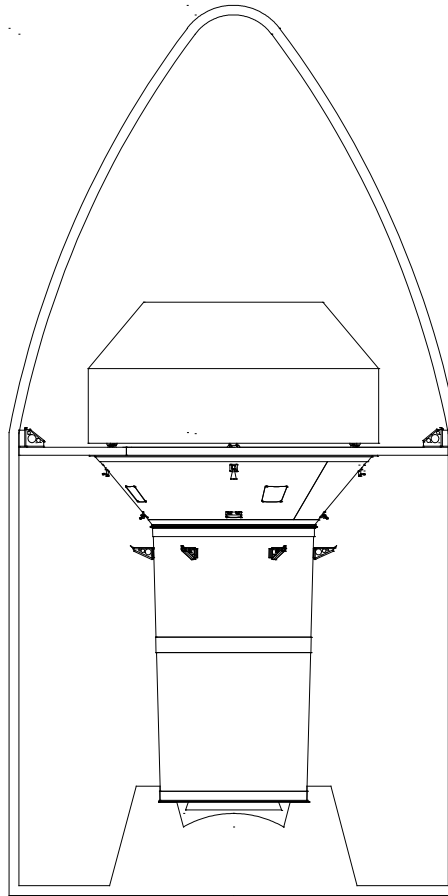
**Deployed Configuration**



# New Baseline Design (8 of 8)



- **Launch Vehicle Configuration**





# New Mass Properties Summary (1 of 5)



## FAME MASS PROPERTIES REPORT (English Units)

VERSION: 8/14/2001

SUBSYSTEM COMPONENT	QTY	TOTAL MASS (lbm)	UNCERT MASS (%)	MASS (lbm)	CENTER OF MASS			INERTIA ABOUT CENTER OF MASS					
					X <sub>b</sub> cg (in)	Y <sub>b</sub> cg (in)	Z <sub>b</sub> cg (in)	Ixx <sub>b</sub> (lbm*in <sup>2</sup> )	Iyy <sub>b</sub> (lbm*in <sup>2</sup> )	Izz <sub>b</sub> (lbm*in <sup>2</sup> )	Pxz <sub>b</sub> (lbm*in <sup>2</sup> )	Pyz <sub>b</sub> (lbm*in <sup>2</sup> )	Pxy <sub>b</sub> (lbm*in <sup>2</sup> )
FLIGHT VEHICLE, STOWED, WET		3191.13	5%	3042.85	0.02	-0.01	58.33	6,426,780	6,321,514	1,186,411	3,670	-1,183	39,756
SPACECRAFT, DEPLOYED, WET		1368.70	10%	1249.89	0.04	-0.01	89.28	751,007	645,918	890,312	-552	153	39,757
INSTRUMENT SUBSYSTEM		525.00	2%	514.19	0.00	0.00	103.99	NA	NA	NA	NA	NA	NA
STRUCTURAL SUBSYSTEM		292.22	12%	260.48	2.22	-0.64	83.04	NA	NA	NA	NA	NA	NA
RCS SUBSYSTEM		227.79	22%	186.98	0.00	0.00	71.41	NA	NA	NA	NA	NA	NA
ADCS SUBSYSTEM		20.08	6%	18.90	0.19	3.82	84.43	NA	NA	NA	NA	NA	NA
MECHANISM SUBSYSTEM (2)		48.73	16%	42.18	-11.76	0.00	83.20	NA	NA	NA	NA	NA	NA
EPS SUBSYSTEM (2)		132.70	12%	118.90	-4.56	4.77	83.31	NA	NA	NA	NA	NA	NA
RF SUBSYSTEM		31.97	9%	29.20	2.20	-9.96	85.53	NA	NA	NA	NA	NA	NA
CT&DH SUBSYSTEM		44.66	9%	41.10	11.54	-5.01	83.47	NA	NA	NA	NA	NA	NA
TCS SUBSYSTEM		45.56	20%	37.97	0.00	0.00	83.44	NA	NA	NA	NA	NA	NA
INTERSTAGE ASSEMBLY (2)		1822.43	2%	1792.96	0.00	0.00	35.08	NA	NA	NA	NA	NA	NA



# New Mass Properties Summary (2 of 5)



## FAME MASS PROPERTIES REPORT (English Units)

VERSION: 8/14/2001

SUBSYSTEM COMPONENT	QTY	TOTAL MASS (lbm)	UNCERT MASS (%)	MASS (lbm)	CENTER OF MASS			INERTIA ABOUT CENTER OF MASS						COMMENTS
					X <sub>c</sub> cg (in)	Y <sub>c</sub> cg (in)	Z <sub>c</sub> cg (in)	Ixx <sub>c</sub> (lbm*in <sup>2</sup> )	Iyy <sub>c</sub> (lbm*in <sup>2</sup> )	Izz <sub>c</sub> (lbm*in <sup>2</sup> )	Pxx <sub>c</sub> (lbm*in <sup>2</sup> )	Pyy <sub>c</sub> (lbm*in <sup>2</sup> )	Pxy <sub>c</sub> (lbm*in <sup>2</sup> )	
FLIGHT VEHICLE, STOWED, WET		3191.13	5%	3042.85	0.02	-0.01	58.33	6,426,780	6,321,514	1,186,411	3,670	-1,183	39,756	
SPACECRAFT, DEPLOYED, WET		1368.70	10%	1249.89	0.04	-0.01	89.28	751,007	645,918	890,312	-552	153	39,757	

INSTRUMENT SUBSYSTEM				525.00	2%	514.19	0.00	0.00	103.99	NA	NA	NA	NA	NA	NA	
INSTRUMENT ASSY, WITH STAR TRACKER ASSY	1 x			525.00	2%	514.19	0.00	0.00	103.99	278383.00	124976.80	329016.70	-1820.50	-592.10	42827.80	MASS PROPERTIES FROM LOCKHEED, 08/01/01

STRUCTURAL SUBSYSTEM			292.22	12%	260.48	2.22	-0.64	83.04	NA	NA	NA	NA	NA	NA	
THRUST CONE BOTTOM RING	1	x	14.71	10%	13.37	0.00	0.00	69.59	2674.59	2674.59	5343.43	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
THRUST CONE SKIN	1	x	49.45	10%	44.96	0.00	0.00	79.19	19162.22	19118.47	36112.31	0.00	-13.47	0.00	CAD MODEL(,125 THK AL), 07/20/01
THRUST CONE TOP RING	1	x	13.93	10%	12.66	0.00	0.00	86.84	7779.97	7779.97	15554.99	0.00	0.00	0.00	CAD MODEL(,250 BY .125 THK AL), 07/06/01
THRUST CONE SKIN DOUBLER	2	x	1.50	10%	1.36	0.00	0.00	78.47	550.84	550.84	1035.76	0.00	0.00	-517.17	CAD MODEL(,125 THK AL), 07/20/01
THRUST CONE ELECTRONICS CLOSEOUT	4	x	2.77	10%	2.51	0.00	0.00	77.64	901.44	901.44	1792.31	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
ELECTRONICS DECK	3	x	92.49	10%	84.09	0.00	0.00	88.25	61403.53	61403.53	122751.00	0.00	0.00	0.00	CAD MODEL(2.00 INCH THK WITH .020 INCH AL F.S.), 07/20/01
ELECTRONICS DECK DOUBLER	3	x	1.65	10%	1.50	-1.02	0.00	89.27	749.94	668.96	1418.90	0.00	0.00	0.00	CAD MODEL(,063 THK AL), 07/20/01
SOLAR ARRAY SUBSTRATE	1	x	38.88	10%	35.35	0.00	0.00	86.25	37543.16	37543.16	75080.43	0.00	0.00	0.00	CAD MODEL(1.00 INCH WITH .020 INCH AL F.S.), 07/06/01
ANTENNA BRACKET, SC LATERAL	2	x	0.76	10%	0.69	0.00	0.00	91.16	4.70	1798.50	1799.95	0.00	0.00	0.00	CAD MODEL(,063 THK AL), 07/20/01
THRUSTER BRACKET, .2 LBF FORCE	4	x	0.86	10%	0.78	0.00	0.00	78.11	27.62	589.09	563.77	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
THRUSTER BRACKET, 5 LBF FORCE	8	x	0.41	10%	0.37	0.00	0.00	84.24	366.19	0.53	366.19	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
SEPARATION CONNECTOR PLATE	2	x	0.10	10%	0.09	0.00	0.00	70.66	27.39	0.15	27.54	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
PROPELLANT SERVICE PLATE	1	x	0.23	10%	0.21	0.00	-21.85	72.71	0.20	0.56	0.54	0.00	0.00	0.00	CAD MODEL(,125 THK AL), 07/20/01
INSTRUMENT SUPPORT BRACKET	3	x	5.40	20%	4.50	0.00	0.00	86.00	3000.00	3000.00	6000.00	0.00	0.00	0.00	UPDATE
RCS DECK	1	x	6.12	10%	5.57	0.00	0.00	70.12	707.32	732.82	1439.21	0.00	0.00	0.00	CAD MODEL(1.00 INCH WITH .020 INCH AL F.S.), 07/20/01
TORQUE ROD SUPPORT	3	x	3.60	20%	3.00	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
ACCELEROMETER BRACKET	1	x	0.60	20%	0.50	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
BALLAST MASS, INERTIA RATIO	1	x	0.00	0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
BALANCE MASS 1, COUPLE BALANCE	1	x	7.85	20%	6.54	17.21	-12.04	70.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM MADER, 08/03/01
BALANCE MASS 2, COUPLE BALANCE	1	x	14.91	20%	12.43	34.51	-5.83	85.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM MADER, 08/03/01
MISCELLANEOUS MASS, FASTENERS	1	x	36.00	20%	30.00	0.00	0.00	80.00	15000.00	15000.00	15000.00	0.00	0.00	0.00	MASS FROM MADER, 07/06/01

RCS SUBSYSTEM				227.79	22%	186.98	0.00	0.00	71.41	NA	NA	NA	NA	NA	NA	
PROPELLANT, HYDRAZINE	1	x	142.00	25%	113.60	0.00	0.00	71.38	4544.00	4544.00	4544.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 07/20/01 - INERTIAS FROM CAD, 07/20/01
PROPELLANT TANK	1	x	60.00	20%	50.00	0.00	0.00	71.35	4081.33	4088.92	4194.78	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01 - INERTIAS FROM CAD, 07/20/01
THRUSTER, 5 LBM FORCE	2	x	1.58	5%	1.50	0.00	0.00	83.94	1521.68	0.67	1521.21	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01 - INERTIAS FROM CAD, 07/20/01
THRUSTER, .2 LBM FORCE	4	x	6.30	5%	6.00	0.00	0.00	76.50	176.30	3959.75	3795.88	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01 - INERTIAS FROM CAD, 07/20/01
PROPELLANT LINE	1	x	7.69	20%	6.41	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PROPELLANT LINE CLAMP	45	x	0.54	20%	0.45	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PROPELLANT LINE STANDOFF	45	x	0.60	20%	0.50	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PROPELLANT FILL VALVE	2	x	0.63	5%	0.60	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PRESSURE TRANSDUCER	2	x	0.53	5%	0.50	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PRESSURE TRANSDUCER CLAMP	4	x	0.21	5%	0.20	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PROPELLANT FILTER	2	x	1.05	5%	1.00	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
PROPELLANT LATCH VALVE	2	x	0.76	5%	0.72	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
FILTER BRACKET	2	x	0.19	20%	0.16	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01
FILL VALVE BRACKET	2	x	0.76	20%	0.63	0.00	0.00	69.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM OSBORN, 06/20/01



# New Mass Properties Summary (3 of 5)



SUBSYSTEM COMPONENT	QTY		TOTAL MASS (lbm)	UNCERT MASS (%)	MASS (lbm)	CENTER OF MASS			INERTIA ABOUT CENTER OF MASS						COMMENTS
						X <sub>cg</sub> (in)	Y <sub>cg</sub> (in)	Z <sub>cg</sub> (in)	Ixx <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Iyy <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Izz <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pxx <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pyy <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pxy <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	
ADCS SUBSYSTEM															
IMU	2	x	3.47	5%	3.31	13.75	16.00	84.50	131.69	163.35	278.35	0.00	0.00	-134.06	MASS FROM TIM, 06/15/01 - INERTIAS FROM CAD, 07/06/01
SUN SENSOR	5	x	3.08	10%	2.80	0.00	0.00	88.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01
SUN SENSOR ELECTRONICS	1	x	0.77	20%	0.64	0.00	0.00	84.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01
NUTATION DAMPER, TORQUE RODS (30 Am <sup>2</sup> )	3	x	6.62	5%	6.30	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01
ACCELEROMETER	4	x	0.65	5%	0.62	0.00	0.00	88.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01
MAGNETOMETER	2	x	2.94	5%	2.80	0.00	0.00	88.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01
STDPU	1	x	2.55	5%	2.43	-17.25	8.25	86.63	9.02	21.70	30.08	0.00	0.00	0.00	MASS FROM DELAHUNT, 06/20/01 - INERTIAS FROM CAD, 07/06/01
MECHANISM SUBSYSTEM (2)															
TRIM-TAB PANEL	3	x	3.84	10%	3.49	0.00	0.00	89.13	6523.99	6523.99	13047.94	0.00	0.00	0.00	CAD MODEL(0.25 INCH WITH .010 INCH AL F.S.), 07/20/01
TRIM-TAB HINGE ASSY	3	x	1.46	20%	1.21	0.00	0.00	89.39	1757.70	1757.70	3515.34	0.00	0.00	0.00	UPDATE
TRIM-TAB MOTOR	3	x	2.76	5%	2.63	0.00	0.00	89.63	3722.49	3722.49	7444.80	0.00	0.00	0.00	MASS FROM KOSS, 06/20/01 - INERTIAS FROM CAD, 07/20/01
TRIM-AREA PANEL	3	x	5.42	10%	4.92	0.00	0.00	89.38	6638.58	6638.58	13277.10	0.00	0.00	0.00	CAD MODEL(0.25 INCH WITH .010 INCH AL F.S.), 07/20/01
TRIM-AREA HINGE ASSY	3	x	1.78	20%	1.48	0.00	0.00	89.50	2020.73	2020.73	4041.40	0.00	0.00	0.00	UPDATE
TRIM-AREA MOTOR	3	x	2.76	5%	2.63	0.00	0.00	90.00	3614.86	3614.86	7228.72	0.00	0.00	0.00	MASS FROM KOSS, 06/20/01 - INERTIAS FROM CAD, 07/20/01
TRIM-MASS MASS	2	x	14.82	20%	12.35	-20.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
TRIM-MASS SUPPORT ASSY	2	x	12.00	20%	10.00	-20.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
TRIM-MASS MOTOR	2	x	1.84	5%	1.75	-20.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM KOSS, 06/20/01
KICKOFF CANNISTER ASSY	4	x	2.06	20%	1.72	0.00	0.00	72.79	335.16	335.16	652.59	0.00	0.00	0.00	UPDATE
EPS SUBSYSTEM (2)															
SOLAR CELL AND WIRING	6	x	20.40	20%	17.00	0.00	0.00	86.25	18056.48	18056.48	36110.13	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
BATTERY, LITHIUM ION	1	x	34.17	5%	32.54	-1.50	14.50	84.04	214.44	236.19	218.50	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
PCDE	1	x	29.70	10%	27.00	-18.34	-2.25	82.27	477.85	524.60	549.68	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
OCB	1	x	8.40	5%	8.00	12.21	14.55	85.51	88.32	93.23	165.16	0.00	0.00	-13.93	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
SAJB	2	x	4.40	10%	4.00	-3.25	-15.25	86.15	63.74	1074.33	1134.57	0.00	0.00	-243.75	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
BCB	1	x	8.80	10%	8.00	-11.00	17.00	83.78	57.85	81.65	73.50	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
TOTAL SC BUS WIRE HARNESS	1	x	26.83	20%	22.36	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM RUTH, 1/17/01
RF SUBSYSTEM															
TRANSPONDER	2	x	10.50	5%	10.00	-1.50	-20.50	86.25	53.32	170.79	217.05	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
DIPLEXER	2	x	2.94	5%	2.80	7.55	-18.05	85.93	38.29	2.77	37.24	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
HYBRID / COUPLER	2	x	0.17	5%	0.16	0.00	0.00	86.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01
ANTENNA, LATERAL	2	x	4.40	10%	4.00	0.00	0.00	91.50	7.70	11328.02	11328.02	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01 - INERTIAS FROM CAD, 07/20/01
ANTENNA, SC AXIAL	2	x	2.20	10%	2.00	0.00	0.00	68.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01
SSPA	1	x	4.18	10%	3.80	15.25	-12.00	85.52	15.61	29.59	37.32	0.00	0.00	0.00	MASS FROM GARNER, 06/15/01 - INERTIAS FROM CAD, 07/06/01
XFER SWITCHES	3	x	0.79	5%	0.75	0.00	0.00	86.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01
SPDT SWITCHES	2	x	0.26	5%	0.25	0.00	0.00	86.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01
GORE CABLING	1	x	6.53	20%	5.44	0.00	0.00	86.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BECKER, 1/17/01





# New Mass Properties Summary (4 of 5)



SUBSYSTEM COMPONENT	QTY		TOTAL MASS (lbm)	UNCERT MASS (%)	MASS (lbm)	CENTER OF MASS			INERTIA ABOUT CENTER OF MASS						COMMENTS
						X <sub>cg</sub> (in)	Y <sub>cg</sub> (in)	Z <sub>cg</sub> (in)	Ixx <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Iyy <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Izz <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pxx <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pyy <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	Pzz <sub>cg</sub> (lbm <sup>2</sup> in <sup>2</sup> )	
CT&DH SUBSYSTEM															
FSC	1	x	44.66	9%	41.10	11.54	-5.01	83.47	NA	NA	NA	NA	NA	NA	MASS FROM BANKUS, 06/13/01 - INERTIAS FROM CAD, 07/06/01
RIU	1	x	11.66	5%	11.10	-13.15	-15.67	83.48	118.12	108.93	119.22	0.00	0.00	26.05	MASS FROM GARNER, 06/19/01 - INERTIAS FROM CAD, 07/06/01
TCS SUBSYSTEM															
THERMAL BLANKET, THRUST CONE	1	x	45.56	20%	37.97	0.00	0.00	83.44	NA	NA	NA	NA	NA	NA	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, RCS DECK	1	x	1.50	20%	1.25	0.00	0.00	68.00	800.00	800.00	1600.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, ELECTRONICS DECK	1	x	7.31	20%	6.09	0.00	0.00	87.00	10000.00	10000.00	20000.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, RADIATOR	1	x	4.32	20%	3.60	0.00	0.00	87.00	10000.00	10000.00	20000.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, SOLAR ARRAY	1	x	12.24	20%	10.20	0.00	0.00	87.00	10000.00	10000.00	20000.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, STAR TRACKER ASSY	1	x	1.08	20%	0.90	0.00	0.00	87.00	10000.00	10000.00	20000.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMOSTAT	1	x	0.69	20%	0.57	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
HEATER	1	x	0.50	20%	0.42	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLACK PAINT	1	x	1.62	20%	1.35	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
GREASE / RTV	1	x	0.64	20%	0.53	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
TAPE	1	x	7.46	20%	6.21	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
INTERSTAGE ASSEMBLY (2)															
INTERSTAGE TOP RING	1	x	1822.43	2%	1792.96	0.00	0.00	35.08	NA	NA	NA	NA	NA	NA	CAD MODEL(125 THK AL), 07/20/01
INTERSTAGE TOP SKIN	1	x	10.01	10%	9.10	0.00	0.00	68.54	1837.27	1837.27	3666.28	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/06/01
INTERSTAGE BOTTOM SKIN	1	x	47.21	10%	42.91	0.00	0.00	54.33	11225.79	11225.79	16744.27	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/06/01
AKM INTERFACE RING	1	x	60.36	10%	54.87	0.00	0.00	20.22	16297.43	16297.43	19479.28	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/06/01
INTERSTAGE BOTTOM RING	1	x	11.67	10%	10.61	0.00	0.00	39.55	1979.05	1979.05	3943.04	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/06/01
SC MARMON CLAMP ASSY	1	x	12.99	10%	11.81	0.00	0.00	0.76	1939.80	1939.80	3869.66	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/06/01
SC MARMON CLAMP RETENTION SPRINGS	6	x	9.24	5%	8.80	0.00	0.00	69.24	1800.00	1800.00	3600.00	0.00	0.00	0.00	MASS FROM HURLEY, 03/05/01
SC MARMON CLAMP RETENTION BRACKETS	6	x	0.30	20%	0.25	0.00	0.00	67.00	0.00	0.00	0.00	0.00	0.00	0.00	MASS FROM HURLEY, 03/05/01
SEPARATION CONNECTOR BRACKET	1	x	0.80	10%	0.72	0.00	0.00	62.91	179.73	179.73	358.34	0.00	0.00	0.00	CAD MODEL(040 THK AL), 07/20/01
THERMAL BLANKET, AKM	1	x	0.61	10%	0.56	0.00	0.00	68.68	183.10	2.76	185.85	0.00	0.00	0.00	CAD MODEL(125 THK AL), 07/20/01
THERMAL BLANKET, INETERSTAGE	1	x	6.75	20%	5.63	0.00	0.00	35.00	1000.00	1000.00	1000.00	0.00	0.00	0.00	MASS FROM BALDAUFF, 08/14/01
THERMAL BLANKET, AKM	1	x	1.80	20%	1.50	0.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	UPDATE
AKM, PROPELLANT	1	x	1461.20	0%	1461.20	0.00	0.00	34.75	261549.35	261549.35	209719.34	0.00	0.00	0.00	MASS FROM OSBORN, 07/20/01 - INERTIAS FROM CAD, 07/20/01
AKM, CASE	1	x	157.50	5%	150.00	0.00	0.00	34.75	26849.44	26849.44	21528.81	0.00	0.00	0.00	MASS FROM OSBORN 03/05/01 - INERTIAS FROM CAD, 07/06/01
WIRE HARNESS	1	x	12.00	20%	10.00	0.00	0.00	40.00	3000.00	3000.00	1000.00	0.00	0.00	0.00	MASS FROM MADER, 07/06/01
BALANCE MASS	1	x	6.00	20%	5.00	0.00	0.00	40.00	1000.00	1000.00	1000.00	0.00	0.00	0.00	MASS FROM MADER, 07/06/01
MISCELLANEOUS MASS, FASTENERS	1	x	24.00	20%	20.00	0.00	0.00	40.00	10000.00	10000.00	10000.00	0.00	0.00	0.00	MASS FROM MADER, 07/06/01



# New Mass Properties Summary (5 of 5)



- Mass Properties Margin Summary (lbm)

	Current Estimate	Uncert	Total w Uncert	Delta II 2925-10	Delta II 2425-10
Instrument	514.2	10.8 *	525.0		
SC Bus	735.7	108.0	843.7		
Interstage	1,793.0	29.4 **	1,822.4		
Flight Vehicle	3,042.9	148.2	3,191.1 (2%)	3,889.0	2,411.9

\* Lockheed Has Additional Uncertainty on the 514.2 lbm Number

\*\* No Uncertainty Assigned to the AKM Propellant Mass

- Mass Properties Conclusion

- Work with Lockheed to meet the Transverse Inertia Requirements Levied on the SC
- The Program would Need to Reduce the Flight Vehicle Mass by 779.2 lbm or 1,261.6 lbm with 20 % Program Margin to Utilize the 4 Strap-



# Conclusion



- **Upcoming Activities**

- **Continue to Update the New Baseline Design with Addition Components, I.e. Z-axis EMT, Trim-Mass Assemblies, -Z-axis Antenna on SC Bus, and RCS Components**
- **Refine Structural FEM Model to Determine Modes and Stresses**
- **Continue to Update the Program Schedule and Budget to Reflect the New Design**
- **Continue to Work Closely with Lockheed to Better Integrate the Overall Spacecraft Design and Mass Properties**

- **Issues and Concerns**

- **Stray Light from Trim-Tab and Trim-Area Assemblies. Could Effect the Instrument Performance**
- **RCS Tank and Component Layout. Need to Select a Baseline Tank that will fit in the Current Design and Provide Enough Deck Surface to Mount all Components**
- **-Z Bus Mounted Antenna Location. Need to Work Closely with RF Subsystem on -Z Bus Antenna Selection and Location**